## Protect Our Species

Earth Day 2019



# Climate Education Week Toolkit



# PROTECT OUR SPECIES

All around the world, human activity is leading to the destruction or rapid reduction of populations of plants and wildlife. Species are going extinct and habitats are shrinking. The vast array of living things in a given place, whether in a small stream, a desert, a forest, the oceans, or the entire planet, is also known as biodiversity. And biodiversity is decreasing faster than ever before. If this problem continues, it will have an overall negative impact on the capacity of the planet to sustain life, including human life. All living things have an intrinsic value, but also serve a purpose and play a role in the web of life. Each species is crucial in the production of key ecosystem services which are indispensable to maintain all life on Earth. For example, the production of food, water, and clean air; the control of climate and disease; the support of nutrient cycles and oxygen production; and the provision of spiritual and recreational benefits.

Only with the support of many more people will we turn the tide and prevent further extinctions.

Earth Day Network is undertaking an effort to engage people, institutions, businesses, and schools across the globe to define the ethical guidelines that should inform our relationships with other living things. Humans constantly make decisions that impact other living things. What are the ethical parameters that we should take into consideration when making those decisions? From deciding how to control living things that we called pests, to buying products made of other animals, to taking wildlife as pets, to developing and destroying natural habitats -- all these activities imply some trade-offs between protecting species and economic development. Ethically navigating those trade-offs will determine the survival of other species while humans continue to thrive on this planet. While many of these concepts are a bit advanced for our younger students, we aim to develop a conservation ethic in all students through educational activities that help them understand the complexities of our natural systems and how each species is a valuable component of our planet.

This toolkit has the objective of getting students engaged in conversation, by learning about the problems and issues that impact other species, how those problems result from interactions with humans or human activity, the ethical issues humans must negotiate while making everyday decisions, and the actions we can take to prevent the rapid disappearance of entire populations of other species. Together we can work to Protect Our Species!

As the famous Baba Dioum quote states, "In the end we will conserve only what we love, we will love only what we understand, and we will understand only what we are taught."

It is our role as educators to help show our students the wonder and awe of this planet to help them develop to be environmentally literate adults.

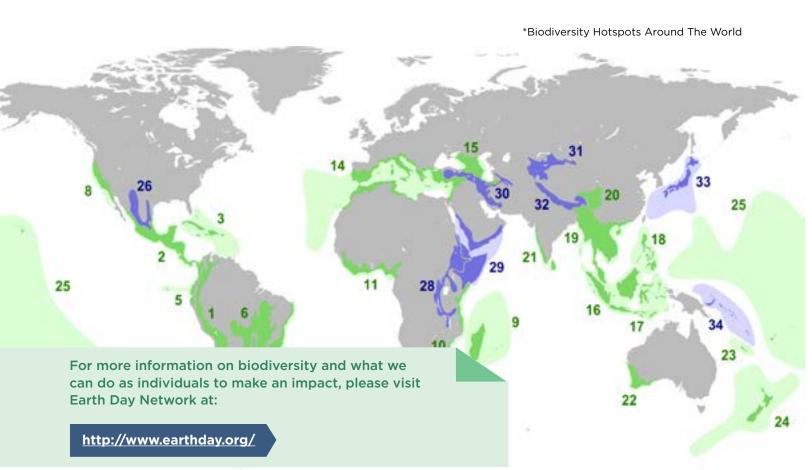


## What is biodiversity? Why is it important?

Biodiversity is the measurement of the variety of life in a particular ecosystem. A region that is home to many different species is one that is biodiverse. Biodiversity is a key measurement of the overall health and well-being of an ecosystem. It is important for students to learn about biodiversity because it is a concept central to environmental science. In the United States is it a prevalent topic in the Next Generation Science Standards and globally biodiversity is a major component of the Sustainable Development Goals (#14 Life Below Water and #15 Life on Land).

Many of us have seen images of enormous flocks of birds congregating in marshes, herds of wildebeest, zebra, and Thomson's gazelle migrating through Africa, or iconic species, such as tigers, elephants, giraffes, and rhinos gracefully moving through their large territories. However, all of these species are imperiled, and it is up to us to take actions to save them from extinction. But it's not just endangered species we need to protect — many insects, marine animals, and even plants around the world have seen their numbers severely reduced.

By introducing students to the idea of biodiversity at a young age and fostering their curiosity and knowledge, we can work to develop an environmentally literate youth who is willing and able to protect species both locally and globally.



### How to Use This Resource

This Toolkit provides a daily focus for Climate Education Week related to the 2019 theme of Protecting Our Species. Each day provides activity suggestions for four academic levels (K-2nd grade: ages 4-8, 3rd - 5th grade: ages 8-11, 6th - 8th grade: ages 11-14, and 9th - 12th grade: ages 14-18) leading the students from awareness to action throughout the week.

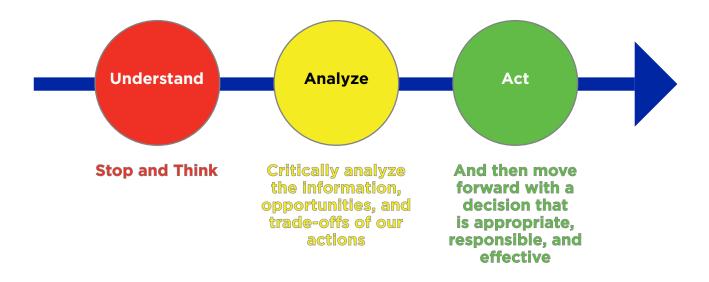
The earlier activities are meant to provide foundational information about the topic. The following activities provide opportunities for students to use higher order thinking skills and synthesize the information. The final activities offer suggestions for age-appropriate actions the students can take to address the issue at hand.

We understand that there is not always enough time to do all the activities every day for a week. However, we wanted to provide a wealth of resources for you to incorporate and utilize whenever they best fit into your curriculum at any point in the year.

In addition to the daily activities, please explore the Appendices at the end of the document. Each Appendix includes abundant resources for you and your students to explore that highlight careers, new technologies, youth leaders, and additional curriculum resources all focusing on the theme of biodiversity.

This color coding of the activities will help you and your students think through the stages of conservation action.

Much like the steps of a traffic signal, **Stop**, **Proceed with Caution**, and **Go**, we need to:









## **Exploring Ecosystems**

TODAY'S SERIES OF ACTIVITIES HELP STUDENTS:

UNDERSTAND THE CONNECTIVITY AND INTERDEPENDENCE AMONG SPECIES IN **DIFFERENT ECOSYSTEMS.** 

K-2 1. Introducing Biodiversity This is a guideline for creating your own lesson plan and allows you to customize the information to your classroom environment. (AAAS) 2. Animal Groups This lesson helps students identify the 5 categories of animals and can be adapted to include animals from your region. (Penn State University) 3. What is Biological Diversity? This is a game based on "musical chairs" to explore how extinction of some species impacts the entire food web. (Convention on Biological **Diversity**) 6-8 4. Eco-llapse This lesson explores the interdependence of local biodiversity. (Purdue University) 9-12

biodiversity.

Students will learn about habitat requirements to protect local



5. Wildlife Habitat

(Penn State University)



## Fascinating Flora

TUESDAY'S LESSONS HELP STUDENTS:

UNDERSTAND THE IMPRESSIVE COM-PLEXITY WITHIN THE PLANT KINGDOM AND THE VALUABLE ROLE PLANTS PLAY WITHIN BIODIVERSITY.

#### K-2

1. Plant Power (Green Education Foundation) Hands on activity where students plant seeds to observe plant structure and growth.

#### 3-5

2. Life Cycle of a Plant (Education.com)

Students will identify and draw the life cycle of a plant and understand what makes the Plant Kingdom special.

3. Supermarket Botany (PBS, must create free account to use)

What kinds of biodiversity can we find in our grocery store? This interactive lesson explores different types of plants we can eat!

#### 6-8

4. Plant's Life Cycle (Common Sense Education)

Students will learn about a plant's life cycle as well as structure and function.

5. Looking for Biodiversity (Discovery Education)

Students will use transects to discover local plant diversity.

#### 9-12

5. Plant Parts Dissection (Study.com, must create free account to use)

This advanced plant biology lesson helps students to appreciate the intricacies of the Plant Kingdom.



## Threats to Biodiversity

Now that your students have learned about biodiversity and the needs of species to thrive, take a look at some of the threats species face around the world. Protecting biodiversity is a big task, but with creativity and motivation we can address these threats and Protect Our Species! The Food and Agriculture Organization of the United Nations lists 5 main threats to biodiversity: habitat loss, pollution, climate change, over exploitations, and invasive species.

#### **Habitat Loss**

Habitats around the world are being destroyed to accommodate to the ever-increasing demands of land for human development and agriculture. Destroying forests, wetlands, and rivers leaves many species struggling to compete and can result in local or global extinctions.

#### **Pollution**

Pollution comes in many forms from nutrients to plastics and can have long lasting impacts on ecosystem health. Humans are introducing a wide range of contaminants that are severely decreasing species' ability to reproduce and ultimately survive.

#### Climate Change

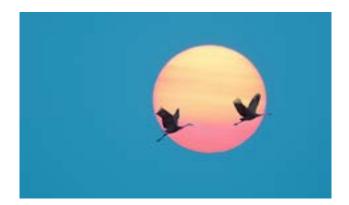
The increase of greenhouses gases in the atmosphere are causing critical changes around the globe to climate patterns and ecosystems. The conditions that many species have relied on for centuries are changing and many species many not survive if their ecosystem changes too rapidly.

#### Over Exploitation

Humans often utilize natural resources for building materials, products, medicine, and food. When plants and animals are removed from their environment unsustainably, they cannot replenish at the same rate they are taken. Over harvesting and over hunting can cause declines in populations that impact all other species in the ecosystem.

#### **Invasive Species**

Intentional and accidental introduction of foreign species into new ecosystems can be extremely harmful to native species. Invasive plants and animals can often outcompete native species because they do not have natural population controls.





## Green Technology Spotlight

Scientists are using "Green Technology" to address the threat of Climate Change. Green technology is any type of scientific invention or innovation devised to reverse or mitigate the negative environmental impacts humans are having on the planet. Due to the complex nature of climate change, it is one biodiversity threat that will greatly benefit from Green Technology advancements.

As noted on the previous page, climate change can have major devastating impacts to biodiversity. Issues such as ocean acidification, extreme temperature changes, increase in natural disasters, and rising sea levels, can significantly alter habitat and access to critical resources.

One of the main ways that humans are contributing to climate change is from the increased burning of fossil fuels, which increases the amount of carbon dioxide (CO2) in the atmosphere. As more CO2 is released from vehicles and industries across the globe, the more that is being added into the atmosphere and absorbed into the oceans and disrupting the balance of carbon pools.

Utilizing technological innovations, such as the Toyota Mirai Hydrogen Fuel Cell Electric Vehicle, can help humans reduce their carbon dioxide emissions to help slow the impacts of climate change. Learn about the What, Why, and How of Hydrogen Fuel Cells and go on an adventure inside a Hydrogen Fuel Cell to see how this technology works.

The following links are short clips featuring Dr. Scott Samuelsen of the National Fuel Cell Research Center, at the University of California, Irvine, who explains new technologies to reduce our individual carbon impact.

- Potential of Fuel Cells in Mainstream Society
- How We Can Use Excess Renewable Energy
- Biomass

Jackie Birdsall and Nazmul Ula are two scientists who explain how they use this technology in their careers and personal lives to make sustainable choices for the planet.

Next Steps: Challenge your students to research other exciting Green Technologies that scientists are developing to address the other threats to biodiversity! Then showcase those results in some type of Green Technology Science Fair and invite other classes to attend.





## What is my role?

TODAY WE MOVE FROM UNDERSTAND-ING TO ANALYZE TO:

HELP STUDENTS USE HIGHER ORDER THINKING SKILLS TO ANALYZE HOW HUMANS INTERACT WITH AND IMPACT LOCAL BIODIVERSITY.

#### K-2

1. <u>Saving Species</u> (American Museum of Natural History) This interactive website helps students learn more about ongoing research dedicated to saving endangered species in the Bahamas, Madagascar, and Australia through the American Museum of Natural History.

2. <u>Habitat Awareness</u>
(Penn State University)

Students will develop an awareness of what is required for survival in different habitats.

#### 3-5

3. Plants and Animals:
Partners in Pollination
(Smithsonian)

This resource from the Smithsonian helps students see how plants and animals interact to accomplish pollination.

4. <u>Creature Challenge</u> (British Columbia Ministry of Education) Students utilize different tools such as a concept map to explore biodiversity.

#### 6-8

5. Exploring the "Systems" in Ecosystems (PBS)

Students will use systems thinking to examine ecosystem functions approach.

#### 9-12

6. Medical Importance of Biodiversity
(Cornell Institute for Biology Teachers)

A biodiversity lab where students explore how humans have benefitted from biodiversity through medical properties of plants and animals.

7. Indicator Species
(Study.com, must create free account)

This lesson defines the term indicator species, then explains the concept using concrete examples students can easily understand.





## How can I help?

TODAY'S ACTIVITIES HELP STUDENTS MOVE THROUGH THE ANALYZE AND **APPLICATION STAGES TO:** 

PUT THEIR NEW KNOWLEDGE INTO PRACTICE BOTH VIRTUALLY AND ON CAMPUS.

K-2

1. Animal Adaptations (AAAS)

Students expand their knowledge of adaptations of different animal species which help them survive in their native habitats. The Development and Extension sections helps students utilize higher order thinking skills.

3-5

2. Plant Biodiversity **Field Activity** (Carolina Biological **Supply Company)** 

This activity takes students outside to explore biodiversity and have a discussion about human impacts on local biodiversity.

6-8

3. Bird Island (Crossing Boundaries) Students use maps and online tools to explore biodiversity of birds.

4. Habitat Loss Game (Minnesota Science Teachers **Education Project)** 

This role-playing activity helps students understand the complexities in protecting biodiversity.

9-12

5. Schoolyard Biodiversity **Investigation** 

(Association of Fish and Wildlife Agencies) Students can own this project to map their school grounds and conduct an investigation to calculate current schoolyard biodiversity.

5. Bye, Bye, Birdie (Population Education) Students problem solve to reduce human impacts on local biodiversity.





## Ready to **Protect Our Species!**

On this final school day of Climate Education Week, we hope you and your students are equipped with new knowledge, skills, and motivation to take action to help Protect Our Species!

By providing high-quality data to scientists across the world, not only are you helping to protect biodiversity, but your students are gaining valuable skills as well as seeing their education in a practical and relevant context.

Here are just a few of the global citizen science projects your students can work on. You can also use SciStarter to explore a wealth of other projects both locally and globally: https://scistarter.com/







### Weekend Adventures

The weekend is a time to encourage your students to spend time outdoors with friends and families participating in a wide range of activities from clean up events, environmental festivals, community gatherings, and quiet time as individual connecting to nature.

Here are just a few ideas of how to spend your weekend commemorating Earth Day 2019!

#### **GO OUTSIDE**

The <u>US Forest Service</u> offers a searchable directory of parks, museums, and natural areas to explore!



#### ATTEND AN EARTH DAY EVENT

Visit your local news outlets to find information on Earth Day events in your community and celebrate this wonderful planet of ours with friends and family.

#### **GET INVOLVED**

Explore the other EDN Toolkits to see how you can plan your own event on Earth Day which addresses the issue of biodiversity in your community <a href="https://www.earthday.org">www.earthday.org</a>.

#### MAKE A COMMITMENT

Take the opportunity to explore options as an individual, a family, and/or a community to reduce your daily dependence on plastic products. Tell us about your commitment and be included in our <u>Billion Acts of Green!</u>





### Earth Day

We hope you have enjoyed the lessons and activities for Climate Education Week! Today is the day to showcase all your students have learned and accomplished! Earth Day is a great day to gather students together for an assembly, a school or community project, or an informational session with ways students can get involved to help protect local biodiversity. One option for Earth Day is to host a Teach-In. A Teach-In is a series of lectures and discussions on a subject of public interest that also provides ideas and pathways for ways to take action on that issue.

You can see our Protect Our Species Teach-In Toolkit for more ideas to mobilize your school to organize a Teach-In for Earth Day 2019.

Please share with us all that you and your students do and accomplish for Earth Day 2019, Climate Education Week, and all year long!

Share photos, videos and stories about what you're doing to Protect Our Species with our Education Department at education@earthday.org. And tag your Facebook, Twitter, and Instagram posts with #EarthDay2019 #ProtectOurSpecies and tag us @EarthDayNetwork.





## Appendix A

## YOUNG LEADERS MAKE IMPORTANT STRIDES TO PROTECT WILDLIFE ALL AROUND THE WORLD!

It turns out you don't need to be an adult to make a difference in the environmental movement! Young leaders make important strides to protect wildlife all around the world! This week is an excellent time for your students to learn that they have the power to change the planet. Here are a few examples of young environmentalists doing invaluable work to hopefully inspire any newcomers to the environmental movement. Share with your students to not only inspire them but to prove that they can make a difference. This list explores just a few young leaders to showcase diversity in natural resource careers. As an extension project, have your students profile one of these individuals or develop a whole new list of young adults working to Protect Our Species!



Hannah Herbst, 17, created an ocean energy probe called BEACON. The device converts the kinetic movement of energy from any moving body of water into usable electricity. The device is made from 90% recyclable material and has endless possibilities for use. Developing countries can utilize this machine as a source of renewable energy.



<u>Delaney Anne Reynolds</u>, 17, wrote a book titled Laws of the Universe. This is what drove her to learn more and care about the environment as she researched issues such as the effects of rising sea levels and climate change on oceans. She interviewed various political leaders and business owners at the local level to come up with a solution for the issues impacting the sea.



<u>Jackson Hinkle</u>, 17, is a Water Ambassador for The Water Effect at The Ecology Center. As a passionate surfer, Hinkle began to realize the effect of plastic pollution on the ocean's ecosystem. All the one-time use plastics being disposed of pollutes the ocean and disrupts the ocean life posing health risks for the species that live there.



<u>Celeste Tinajero</u>, 21, became interested in the environment after her brother created the Eco-Warrior Club at her high school. They competed to win money at the GREENevada Student Sustainability Summit and won first place. Using the money, they renovated their school's bathrooms to be more ecofriendly. Tinajero is now the manager of a nonprofit organization called Keep Truckee Meadows Beautiful, where she helps teach school curriculum through sustainable living.



<u>Miranda Wang</u>, 24, has developed a chemical recycling plan that took previously unrecyclable materials and allows them to be broken down into usable renewable chemicals. This system will allow for a cycle of recycling instead of wasting, and for further development of a sustainable economy.



## Appendix A (Cont.)

## YOUNG LEADERS MAKE IMPORTANT STRIDES TO PROTECT WILDLIFE ALL AROUND THE WORLD!



<u>Hugh Weldon</u>, 25, created an app that calculates a person's environmental footprint by taking a photo of a shopping receipt. The app then suggests personalized ways in which the user can limit their impact. He wanted a way that would allow people to be able know and actively change their own impact on the environment.



<u>Arpit Dhupar</u>, 25, created a filter for diesel generators and engines that have little to no impact on the efficiency of the engine while capturing as much as 90% of carbon particulates. Carbon particulates are then reused and made into color for ink.



<u>Shady Rahab</u>, is 26 and lives in Egypt and wants to use trash as a way of bringing young trash collectors together, giving them a sense of community, and healing relationships among communities. By taking this trash, making instruments out of them, and then training young people to play with them, he hopes to bring about further positive outcomes.



<u>Gator Halpern</u>, 27, founded the Coral Vita network that seeks to restore endangered reefs and ecosystems. The coral farms are land-based and accessible meaning that amount large of coral can be grown from one of these farms. With the cooperation from locally based communities there is a greater and deeper impact on threatened ecosystems.



## Appendix B

#### **BIODIVERSITY CAREERS**

There are countless options for professional careers that help protect or boost biodiversity across the globe. Here are just a few environmental heroes who work in different parts of the world. Your students can do career profiles on these individuals or find more to add to the list!



#### **Raul Montenegro**

Raul has dedicated his life to involvement in a number of different environmental movements including many successful anti-nuclear campaigns, helping to establish national parks, proper toxic waste disposal campaigns, helping protect forests and endangered animals, working in environmental legislation and education, and is now working as Director of the international Biomass Users Network and FUNAM's (Environmental Defense Foundation) main representative of the UN economic and social council. In addition to his community involvement in campaigns, Raul has maintained a successful academic life by publishing in journals and contributing to ecological advances.



#### **Evaristo Nugkuag**

After realizing all Aguaruna Indians living in the Peruvian Amazon face similar issues of cattle ranching, mining, and logging destroying their homes, Evaristo created a coalition of many tribal groups from that region called the Alliance of the Indian Peoples of the Peruvian Amazon. This organization then set out to initiate projects relating to environmental issues on indigenous lands. From there, he formed the COICA (federation of Indian organization's) which connected more indigenous groups from Peru, Bolivia, Ecuador, Brazil, and Colombia than ever before. Through this, he was able to establish an important alliance between the indigenous people and their environmental communities on an international level.



#### **Ernest Bekarany**

Ernest has spent 20 years of his life helping the ploughshare tortoise escape the jaws of extinction. Because of the breeding program he developed, the ploughshare tortoises are slowly being reintroduced to its native habitat of Madagascar. Ernest's help in the reintroduction model used for the ploughshare has been recognized as the most successful in the world.



#### **Collet Ngobeni**

Collet Ngobeni was born in 1985 and dreamed of breaking the unemployment pattern of both of her villages. She joined the Black Mambas to not only work to preserve the heritage and culture of South Africa for future generations, but to also be a positive role model for her daughter. The Black Mamba Anti-Poaching Unit is female dominated. In 2015 the group won the United Nations Champions of the Earth Award for their work. Their aim is to protect rhinos by patrolling and looking for poachers, getting rid of traps and snares, and establishing boundaries. Since they have arrived, no rhinos have been killed in their section.

## Appendix B (Cont.)

#### **BIODIVERSITY CAREERS**



#### **Fabien Cousteau**

Fabien Cousteau was born in 1967 and grew up on his father's and grandfather's ships. He is an aquanaut, ocean conservationist, documentarian, environmental advocate, and ocean-ographic explorer. Cousteau began his career as an explorer for National Geographic and participated in a television special on sharks. He then produced his own documentary called "Mind of a Demon" which aired on CBS. He did a number of other documentaries on PBS, and currently runs his own non-profit, called Fabien Cousteau Ocean Learning Center, which works to restore the water ecosystems of local communities.



#### **Angel Alcala**

Angel Alcala was born in 1929 and is from a coastal village in Cauayan called Caliling which is located in the Philippine province of Negros Occidental. Alcala started his career as a professor at Silliman University in the Biology Department, and later served as executive director of the Philippine Council for Aquatic and Marine Research and Development. Some of his achievements include identifying 50 new species of amphibians and reptiles, making sure conservation programs in the Philippines were established, constructing the first artificial reef in Dumaguette.



#### **Jane Goodall**

Jane Goodall is a British Primatologist and world leading chimpanzee expert. She spent 55 years studying the primates in Tanzania and advocating for animal rights. She decided to advocate for animals when she discovered the chimp's development and use of tools. Goodall noticed that this is something that chimps and humans share in common. Goodall worked to plan ways for human development to continue without causing further harm to the environment.



#### **Rosa Brewer**

As a professor at the University of Minnesota, Dr. Rose Brewer has published various journals and articles. She focuses her work on environment justice and African American values. She is the chair on an advocacy group called the Environmental Justice Advocates of Minnesota. Her and the group support sustainable economies that encourage safe environments. Brewer was also the head organizer of the Black Environmental Thought Conference in Minneapolis.



## Appendix C

#### **EXTRA CLASS RESOURCES**

- <u>Project WILD</u>, from the Association of Fish and Wildlife has hundreds of activities made specifically for different ages! The activities are also helpfully broken down into sub-topic which makes it quite easy to find the right lesson for your classroom.
- <u>The World Wildlife Fund</u> has several age-appropriate lesson plans for varying levels. On top of that, they provide vital resources for understanding both habitat loss and decreasing biodiversity. They are a great first stop for explaining the necessity of climate action now.
- The National Wildlife Federation, like the WWF, has a fantastic collection of educator tools. They focus specifically on species and habitat protection, so their website is another good first stop for key information on the status of species in the US. Their focus is solely in the U.S. so those living elsewhere may not find this resource as useful.
- <u>The Association of Zoos and Aquariums</u> offers certification for zoos and aquariums around the world. As an organization it is committed to helping people learn to respect and conserve wildlife and wild places through zoos and aquariums.
- With offices in 15 countries and projects in more than 40 countries, <u>The International Foundation</u>
   <u>for Animal Welfare</u> rescues individual animals, safeguards populations, preserves habitats, and
   advocates for a better future for all animals, ourselves included.
- Conservation efforts for Whales, Giraffe, Coral, Bees:
  - Whale and Dolphin Conservation A U.S. based organization advocating for the protection of whales and dolphins worldwide.
  - <u>Giraffe Conservation Foundation</u> The only NGO dedicated solely to the protection of giraffes in the wild throughout Africa.
  - <u>The Coral Reef Alliance</u> An organization leading research, education and public awareness campaigns to preserve the health of coral.
  - <u>The Honey Bee Conservancy</u> A U.S. based non-profit centered around, you guessed it, bee conservation. Bees are an integral species in any ecosystem and this organization works to educate people on their importance.



## Appendix D

#### **GET READY FOR 2020!**

April 22nd, 2020 will be the 50th anniversary of the establishment of Earth Day! Stay in the loop with Earth Day to see how you, or your students, can be active next year to make 2020 the biggest Earth Day celebration yet!

The 2020 plan promotes global engagement at every level of education, appealing to people from all walks of life, regardless of their race, creed, culture, social status, or economic standing.

The goal is to equip students with skills, knowledge, and a sense of purpose to enhance their ability to create meaningful change.

Together we will S.A.V.E. our Earth





**Earth Challenge 2020** will be one of the largest citizen science initiatives ever attempted, strengthening the nexus between science, the environment, and people's quality of life.



**Earth Day Events** will mobilize, activate, and amplify commitments from millions of students around the world. These events will range from the schoolyard to the National Mall in DC.



**The Great Global Clean-up** will be the world's largest ever coordinated, environmental volunteer effort, engaging millions of students to clean up their schools, communities, and natural areas.



**The Global Teach-In** will involve millions of students, educators, and individuals, sparking new ideas and opportunities to educate for action.





#### **EARTH DAY NETWORK**

#### UNDERWRITERS:



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